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THE TUBERCULOSIS PROBLEM IN THE UNITED STATES.

BY S. A. KNOPF, M.D.

“It is in the power of man to cause all parasitic diseases to disappear from the world.” These words, spoken by an immortal master of modern medicine, the late Louis Pasteur, have to no disease a more just application than to tuberculosis. To the lay mind it may seem like a paradox to say that, though nearly every sixth individual is tuberculous, and though pulmonary tuberculosis, commonly called consumption, is the most fatal and the most frequently contracted of all diseases, one-seventh of all deaths being due to it, it is nevertheless the most curable of all chronic ailments. But not only is consumption the disease which can be most frequently cured, especially when the invalid submits himself to treatment during the earlier period of his affliction, but it is also the disease which can be most easily prevented. Indeed, it is the disease which the power of man could cause to disappear from the world with more certainty than any other.

Tuberculosis is a parasitic disease *par excellence*. The parasite is the *bacillus tuberculosis*, discovered by Robert Koch in 1882. It is a minute organism, in the shape of a cylindrical rod, visible with a high power microscope only after certain staining reagents have been applied to it. This micro-organism, belonging to the order of schizo-mycetes or fission-fungi in the lowest scale of vegetable life, is the specific microbe of consumption; without its presence there is no tuberculosis. Its action upon the animal organism is two-fold—local, by destroying the tissue; general, by secreting toxins which poison the entire system. The bacillus of tuberculosis may enter the human organism, firstly, by ingestion, that is to say, through food coming from tuberculous animals;

secondly, by inhalation, that is, inhaling dusty air laden with bacilli. Such an atmosphere we may encounter wherever consumptives are careless in the disposal of their expectoration. A tuberculous invalid expectorates, at times, as many as seven billion bacilli per day, and it has been demonstrated again and again that the dried and pulverized sputum of consumptives is one of the most frequent means of transmitting this disease. The third method of infection is by inoculation, that is to say, the micro-organisms enter directly into the circulation through an open wound. The most frequent way in which this occurs is through handling a broken glass or porcelain spittoon that has been used by a tuberculous individual.

Let us see what has been done, and what can be done, by the State, the community and the individual to prevent the propagation of this disease, and ultimately to eradicate it.

One of our best American authorities on this subject, Dr. F. W. Smith, of the Tuberculosis Committee of the State Board of Health of New York, wrote me some time ago that, in his opinion, the first great step toward the prophylaxis of tuberculosis in man should be to stamp out the disease in cattle.

Martin, of the Royal Commission to investigate tuberculosis in Great Britain, is of the same opinion; and so are many of our most distinguished American physicians and sanitarians who have studied the question of tuberculosis. But how far removed we are, in this country, from effectually stamping out tuberculosis in cattle, may be gathered from a report which I submitted last year to the Section of State Medicine at the forty-eighth annual meeting of the American Medical Association,* from which I give a few extracts here.

There are fourteen States which have bovine laws and regulations, and in which circulars are issued for public instruction in regard to tuberculosis in man, viz.: California, Colorado, Connecticut, Iowa, Maine, Massachusetts, Michigan, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, Virginia and Wisconsin; two which have bovine laws, but where apparently nothing is done to stop the spread of tuberculosis in man, viz.: Minnesota and South Dakota; one which has bovine laws, but cannot enforce them for lack of funds, and where thus far the

* "The Present Status of Preventative Means Against the Spread of Tuberculosis in the Various States of the Union, Critically Reviewed." *Journal Am. Med. Ass.*, Vol. XXIX., No. 18.

board has only issued circulars on the prevention of tuberculosis in man and beast, viz.: Tennessee; two (the District of Columbia and Oklahoma Territory) which have a law prohibiting the sale of tuberculous milk, but nothing else concerning tuberculosis in man or beast; eight which issue circulars of instruction concerning tuberculosis in man, but where nothing is done in regard to bovine tuberculosis, viz.: Delaware, Indiana, Kentucky, Louisiana, New Mexico Territory, Ohio, Texas, and West Virginia; nine where nothing is done to stop the spread of tuberculosis in either man or beast, viz.: Alabama, Arkansas, Illinois, Kansas, Maryland, Mississippi, North Carolina, North Dakota and South Carolina; seven which have no board of health, viz.: Georgia, Idaho, Montana, Nebraska, Oregon, Utah and Wyoming; five from which I received no answer, viz.: Florida, Missouri, Nevada, Vermont and Washington.

To the letters addressed to the health officers of forty of our largest cities, I received twenty-nine answers. In one-third of these it was stated that nothing at all had been done concerning the prophylaxis of tuberculosis.

This state of affairs speaks for itself, and shows that as a nation we have a most limited protection from tuberculosis in man and beast.

To combat tuberculosis in cattle and other domestic animals effectually, the federal government, having equal jurisdiction over all the States and Territories, is alone competent. How this should be accomplished enters not into the scope of this article. Abler men than myself will outline the workings of such a national institution, which might justly have its centre in the Bureau of Animal Industry in Washington, which has already done such excellent work in the direction of preventing bovine tuberculosis. But the physicians, sanitarians and statesmen, intrusted with the care and preservation of the lives of American citizens, should appeal to the United States Government to take into its own powerful hands the task of stopping the spread of tuberculosis through the bovine race. By judicious legislation and proper enforcement of laws in this direction, individuals and communities would ultimately be spared the loss and destruction of valuable live stock and property, and thousands of precious human lives would be saved.

The Board of Health of the City of New York has endeav-

ored to enforce the registration of all tuberculous cases. The great majority of the medical profession has opposed any attempt in that direction as untimely. Still, the careless and ignorant consumptives should be controlled and prevented from doing harm. The same board and many other city boards have passed ordinances forbidding expectorating in street cars or on the floors of public buildings, and some even make it punishable to expectorate in the street. But anyone who observes at all will be surprised to note how little these ordinances are heeded. From a sanitary point of view, I am inclined to think that a more general use of the pocket flask, not only by those who are tuberculous, but also by those who have a simple cold or grip, would solve the problem of expectoration. The boards of health, the hospitals and dispensaries should distribute such flasks free of charge to all pulmonary invalids coming under their care. They should preferably be made of some light metal (aluminum or nickel) to protect the patient from the danger of inoculation through breakage. The use of the handkerchief for this purpose, while better than spitting on the floor, is certainly not very sanitary, and I have no doubt, at times, is the cause of a severe reinfection of the nasal mucous membrane.

The general public, however, does not always see things with the same eyes as the sanitarian, and some pulmonary invalids will absolutely refuse to adopt a course which would attract attention to their infirmity. The only remedy in such cases is to tell them to have pockets of impermeable material and carry with them a sufficient number of cheap handkerchiefs, squares of muslin or Japanese paper handkerchiefs, for the exclusive purpose of expectorating therein. These handkerchiefs should be burned as soon as possible after use. Of course, such patients take their chances of infecting their hands by manipulating the soiled handkerchiefs, and they should be enjoined never to touch any food with their hands without having thoroughly washed them.

The whole matter of preventing the spread of tuberculosis must forever be educational work on the one hand, and on the other the work of the State and municipal authorities, in the care of the consumptive poor and those of moderate means.

The school physician, aided by the teacher of hygiene in our public schools, must inculcate upon the pupils the ordinary prin-

ciples of how not to become pulmonary invalids. Respiratory exercises, outdoor singing and declamation when the weather permits, will form an important part in this work. The Board of Health will have to educate the public by circulars and general instructions, and by offering gratuitous disinfection of apartments, bedding and wearing apparel. Such educational work has been most creditably done during the past years by the New York City Board of Health and in Philadelphia by the Society for the Prevention of Tuberculosis. But the greatest amount of good, the work which will be educational, preventive, and curative at the same time, must be done by the State and municipal authorities, aided by wealthy and generous citizens, by creating and maintaining a considerable number of special institutions, sanatoria,* hospitals, dispensaries, etc., for the exclusive treatment of tuberculous patients.

The need of such institutions has been demonstrated again and again; but, strange as it may seem, in this country we have fewer sanatoria for tuberculous patients, absolutely and relatively to our population and to the number of consumptives, than either Germany, England or France. The only State institution of this kind in America was recently opened at Rutland, Mass., with a capacity of 300 beds, and is called the Massachusetts State Hospital for Consumptives. The great city of New York, with its 10,000 tuberculous poor, has not enough accommodation for 500 consumptives, unless they are placed in the general hospitals, where they are a constant menace to their fellow patients suffering from acute diseases. It is not rare that a patient with typhoid fever, entering the ward of a general hospital, leaves it cured from that disease, but taking with him from the hospital the germs of tuberculosis, the invasion of which his enfeebled organism will not withstand. Still, there are in this country statesmen, physicians and philanthropists who doubt the need of special institutions. To such I would suggest a visit to the consumptive poor in the tenement districts of our large cities, and to study the hygienic and social conditions of these sufferers in their surroundings. Let them watch some of the tuberculous

* Contrary to the custom of many English-speaking people, especially in the United States, I call these establishments *sanatoria* and not *sanitararia*. The former (sanatorium), from *sanare*, to heal, gives a better equivalent to the German "Heilanstalt," the word used by the originator of this system (Brehmer). Secondly, the word *sanatorium*, from *sanitas*, health, is usually employed to designate a place considered simply as especially healthy, a favorite resort for convalescent patients.

families. After lingering a year, either the mother or father dies of consumption, and the remaining partner, having become infected by nursing the companion, dies a year later, after having buried half of the children, who have succumbed to tuberculous meningitis. I am sure these visitors will emerge from the dark, dreary rooms and the crowded, unclean houses which serve as habitations for millions of poor people, thoroughly convinced of the urgent need of measures to relieve these consumptive sufferers. Let these doubters also experience the difficulty of gaining admittance as a tuberculous patient into a general hospital supported by private charity, or let them watch the rapid decline the poor consumptive often makes, even if he has been fortunate enough to be admitted to a general public hospital, and they will become still more convinced of the urgent need of creating special institutions for this class of patients. It will be clear to them that something must be done in the interest of the sick, as well as in the interest of the still healthy portion of the community.

But how can this be done, and done effectually? What class of patients should the State or municipality take care of? Only the curable, or only the incurable ones? Only the poor, or also those of moderate means? If any government is in earnest in its endeavor to combat tuberculosis effectually, besides its regularly enforced laws against bovine tuberculosis, its thorough hygienic measures against tuberculosis in man through sanitary regulations and public instruction, it must take upon itself the care and treatment of the curable and incurable cases of tuberculous patients, among the poor and among those of limited means. I mean here by limited means a financial condition which does not permit a tuberculous patient to enter a private sanatorium, or to have at home such medical, hygienic, and dietetic care as will assure him the best possible chance of recovery.

The next point to be considered would be how to recruit the patients, and how to discriminate between the proper and improper cases.

In an address which I was invited to deliver recently before the thirteenth annual conference of the State and Provincial Boards of Health of North America,* I made the following suggestions in regard to these questions:

* "The State and Municipal Care of Consumptives." *Medical Report*, September 24, 1898.

"Just as there exists in nearly all States or municipalities, a commission or a number of special examiners, for the purpose of determining who is a proper subject for State care in an asylum for the insane, so should there exist a commission for the determination of admission to a municipal or State institution for consumptives. Such a commission, composed of a certain number of general practitioners and health officers, should be aided in its work by the charity organizations. Each and every case should be investigated by a combined committee of physicians and laymen, for the following purposes :

"1. To determine the applicant's condition by a medical examination.

"2. To visit his home if he has been found tuberculous, and to institute such hygienic measures as seem necessary (distribution of pocket spittoons, disinfectants, etc.).

"3. To examine the other members of the family, in order to find out if any of them have also contracted the disease, and, if so, to counsel proper treatment.

"4. To report in full to the sanitary authorities concerning the condition of the patient's dwelling. Its renovation or even destruction may become imperative when it is evident that tuberculosis has become 'endemic' there, owing to the condition of the soil or to other sanitary defects.

"5. To determine the financial condition, whether the patient is or is not able to pay, and whether or not by his being taken to an institution the family will become destitute.

"If the latter should be the case, it would become an imperative duty for the municipality to provide for the family. In many cases a letter of inquiry, sent to the former medical attendant of the patient, would materially aid the work of the investigation committee.

"Any individual should have the right to present himself for examination, and every physician should be at liberty to recommend any person for examination to the board of his precinct or district."

The institutions needed to carry out this plan would be:

1. A centrally located reception hospital and dispensary. The dispensary should treat the ambulant tuberculous patients, whose admission into the sanatorium is impracticable or has to be delayed for want of room. These dispensaries should also serve the patient discharged from the sanatorium as a place to seek counsel, and thus aid in his continued improvement and guard against the possibility of a relapse.

2. One or several city sanatoria, located in the outskirts, and if possible in a somewhat elevated region, where the atmosphere is known to be pure. Here all patients should pass through a preparatory sojourn before being sent to the mountain sanatorium. The more advanced cases would all be retained here.

3. One or several mountain sanatoria at no greater distance from the city than three or five hours by rail, at an altitude, if possible of between one thousand and two thousand feet, on porous ground, with southern exposure, as nearly as possible protected

against the coldest winds by higher mountains, and preferably surrounded by a pine forest. A farm in the vicinity, where the thoroughly convalescent patients could do light work, might make the institution in a measure self-supporting. To this place the selected incipient and the improved cases from the city sanatorium should be sent to complete their cure. To the mountain sanatorium there should also be attached a department for children suffering from pulmonary tuberculosis.

4. Several seaside sanatoria for the treatment of children afflicted with tuberculous diseases of the joints and other tuberculous (scrofulous) manifestations.

5. A maternity sanatorium where tuberculous mothers should be received a few months previous to their confinement and surrounded by the best hygienic and dietetic care. They should also remain in the sanatorium for some time after childbirth. It is only by taking away these mothers from their unsanitary tenement homes, and placing them under constant medical supervision in such an institution, some time before and after their confinement, that the fearful mortality among tuberculous mothers after childbirth can be reduced.

The beneficial effect on the woman's and child's constitutions through such an arrangement can hardly be overestimated. Leaving aside the physical well being thus largely assured to mother and child at a period when their organisms need the most tender care, the hygienic training which the mother will have received in such an institution will be of lasting utility to herself and child, to the family and to the community.

These maternity sanatoria need not be situated at a great distance from the city. All that would be essential is that they should be erected on good porous ground, preferably somewhat elevated, and in a locality where the atmosphere is as pure as possible. The buildings should be constructed according to the principles of modern obstetrical science and modern phthisiotherapy. The physician in charge should be experienced in both these branches of medicine.

From the foregoing it will be seen that I am in favor of treating tuberculous patients near their homes, and in the same or nearly the same climate as that in which they will have to live and work after their restoration to health. My reasons for advocating such principles are founded on

the experiences of all modern phthisio-therapeutists, who have demonstrated that the hygienic and dietetic treatment in special sanatoria is feasible and successful in nearly all climates. I know from personal observation that cures of pulmonary tuberculosis effected in our ordinary home climates, which are on the average not considered as especially favorable to this class of sufferers, have been more lasting and more assured than cures obtained in more genial climes. And, with all due deference to the opinion of others, I do not believe there exists any climate which has a specific curative quality for any form of pulmonary tuberculosis. Climate can only be considered as a more or less valuable adjuvant in the treatment of consumption, but not a specific.

It is, furthermore, my firm conviction that for social and economic reasons the majority of tuberculous patients will have to be treated near their homes. Only by adhering to this principle can we expect to cope successfully with tuberculosis—this disease of all climes, but which is most prevalent in large centres of population, where civilization has seemingly attained the highest standard.

That from the presence of properly conducted sanatoria for consumptives not the least danger can arise to the locality where such institutions may be placed, I have demonstrated in several of my previous writings,* from the official statistics concerning the mortality from tuberculosis for forty and for one hundred years, respectively, before and after the establishment of a sanatoria for consumptives in certain villages in Germany. I will only summarize these statistics here.

In the two villages, Goerbersdorf and Falkenstein, where five of the largest sanatoria are situated, the mortality from tuberculosis has actually decreased among the village people more rapidly and more largely than anywhere else, it being now one-third less than before the establishment of those institutions. Thus we see that properly conducted sanatoria for consumptives not only serve as hygienic educators to individuals and families, but as instructors in hygiene to whole communities. The example in scrupulous cleanliness set by employees and inmates of such sanatoria thus bears the best fruits. For, in reality, pulmonary tuberculosis is not a contagious disease; the contact *per se*, the touch of the invalid, is not capable of transmitting the disease;

* "Are Sanatoria for Consumptives a Danger to the Neighborhood?" *Medical Record*, October 3, 1896; *Revue de la Tuberculose*, Paris, Vol. III., pp. 313-319.

it is the ignorant, unclean, or helpless patient, who, by his mode of disposing of his expectorations, endangers the life of others. The breath of a consumptive is not to be feared, it does not contain the tubercle bacilli, nor its spores, nor other dangerous organisms. Thus it is more correct to call pulmonary tuberculosis only a highly communicable disease, and we repeat, from living or coming in contact with a clean, conscientious, tuberculous invalid, nothing whatsoever is to be feared. At that excellent American institution, the Adirondack Cottage Sanitarium at Saranac Lake, under the direction of Dr. E. L. Trudeau, not one of the nurses or medical attendants who have worked in it in the past fifteen years has ever contracted pulmonary tuberculosis.

To create the large number of institutions needed to combat tuberculosis by isolating the hopeless cases in special hospitals, and sending the curable ones to sanatoria, the State and municipal funds are scarcely sufficient at present. While it is to be hoped that the respective authorities will do their share, the need of a number of large sanatoria in this country is so great that we must appeal to the wealthy and philanthropic citizens to come to our aid in establishing sanatoria for the consumptive poor.

In England, Germany and France the government has created some institutions, but the majority of the sanatoria existing in these countries have been created and are maintained by the generosity of individuals. Recently, in England, the Prince of Wales has given the matter his attention. He presided over the first meeting held at Marlborough House, a few weeks ago, for creating and maintaining sanatoria for the consumptive poor. Some of the crowned heads of Europe, such as the Czar of Russia, the Empress of Germany, the Emperor of Austria, the King of Saxony, the King of Sweden and the young Queen of Holland, have placed the sanatoria for the consumptive poor under their high protection, and have opened their private purses for their support. The nobility and the leaders in finance, art, and literature have been eager to imitate the noble example set by their sovereigns, and they, too, have given freely toward the erection and maintenance of such institutions.

Shall this great country, with all its wealth, with its many generous and patriotic philanthropists, remain behind in the onward march of effort to eradicate a disease to which rich and poor, old and young, fall victims by thousands every year? In

no other country has the mortality from tuberculosis diminished in such a marvelous way as in England, where special hospitals for consumptives have been flourishing for over fifty years. The death rate per million of the population of England and Wales from pulmonary tuberculosis was in the years named as follows:

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|-----------|-------|
| 1870..... | 2,410 |
| 1880..... | 1,869 |
| 1890..... | 1,682 |
| 1896..... | 1,307 |

Every consumptive taken from the tenement districts to a sanatorium or special hospital to be cured, or for the purpose of isolation, means a suppression of a centre of infection. Every tuberculous patient cured means another breadwinner and useful citizen, who might have become otherwise a public charge.

The curability of pulmonary tuberculosis is demonstrated every day. The most frequent and most certain cures are obtained by the hygienic, dietetic, and educational treatment in sanatoria; that is to say, institutions where the open air treatment, the best food, and the thorough hygienic management constitute the main factors of therapeutics. Here the patient is not only cured, but taught how to remain well, and how not to infect others.

The average results obtained in sanatoria for early cases are fifty to seventy per cent. of cures; for the more advanced they vary from fifteen to twenty-five per cent. If I apply Vaughan's estimate for 1896 to 1899, I may say that, of the seventy million people living to-day in the United States, ten million or more will die of tuberculosis, unless something is done to prevent it.

There is much that can and should be done. Let our statesmen work to create a department of public health at Washington, with full power to combat bovine tuberculosis. Let our municipal authorities, with strict but humane laws, reduce the danger of the transmission of tuberculosis from man to man. Let statesmen, municipal authorities, physicians, and philanthropists unite to establish sanatoria and kindred institutions for tuberculous patients, especially for the poorer classes, for from these arises the greatest menace to the public health. Then with the dawn of a new century we may hope to see a satisfactory solution of the tuberculosis problem in the United States.

S. A. KNOPP.